PATRIOT

M12

LA type soldering iron controller

Instruction manual

(User's manual)

Preparation in July. 2013

The 7th edition

JAPAN BONKOTE CO., LTD.

BONKOTE®

Contents

1 Preface ・・・

1. Preface

Thank you very much for purchasing **[M12 Controller].**

Please read Notes for safety before use, and use this machine properly,

also keep this manual after read.

2. Notes for safety

C A U T I O N !

Be sure to read this manual before using this machine.

- Never touch the power and 5P core relay cord with dump hands. Otherwise, you may get hurt due to electric shock and etc. (death at worse)
- Never dampen the iron tip with water or other liquid. Otherwise, burst cord may cause fire, malfunction, electric shock and etc. (death at worse)
- Take great care to handle the soldering iron while it is not rested on the workbench. Otherwise the heated tip may cause fire or adjacent operators may get hurt.
- Never touch the iron tip while current is being passed. Otherwise, you may get burnt. If you have to touch the tip like replacement of iron tip or parts, turn off the power and pull out the power plug from the receptacle, wait for a while and check if it has already cooled down sufficiently by using a thermometer or etc.
- Do not overhaul the machine when the machine has trouble. Otherwise, it may cause malfunction, electric shock and etc (death at worst). Contact with our customer service department and follow instructions to make maintenance.
- Be sure to use proper replacement parts such as fuse, checking capabilities. Otherwise, parts with wrong capacities may cause fire, malfunction and etc.

3. Recommendation of Auto-tuning before use

It is recommendable to do Auto-tuning before use, to operate with good effect for each conditions (iron tip temperature, shape of iron tip, etc.) and each environment, although each parameter is set with the standard parameter value at the shipment.

※Auto-setting with simple key operation.(How to do, please refer P.7)

4. Notes for installation and use

- This machine is designed with earth specification. For safety, be sure to use an earth-quipped receptacle. (If you do not have such receptacle, install an earth separately.)

- For surrounding conditions, use this machine on neat bench on which a conductive mat is put.

- Refrain from place where the machine would be exposed too much moisture, direct sunshine, much dust and vibration.

- In order to prevent static electricity, it is recommended using a static electricity removal device, wrist strap etc.

- Odor is generated due to the use of solder and flux. Be sure to ventilate work places. (E.g. fitting of ventilator etc.)

- Be sure to pull out the power plug, when the machine is not used.

- Be sure to grab the power plug instead of cable, when inserting and pulling out the plug.

- If the power voltage is changed from 100V to 220V, make sure of confirm the specifications of the soldering iron unit before the change.

- If flammable objects are placed near this machine, there is a danger of fire. Be careful.

- Be sure to check the slack of each screw before use. If the screw is loosen, tight it.

- Do not use this machine for purpose other than the original purpose.

5. How to use M12 controller

(A) Contents

① Soldering iron stand (BON-11)

② 3P Power cable ※

③ M12 Controller

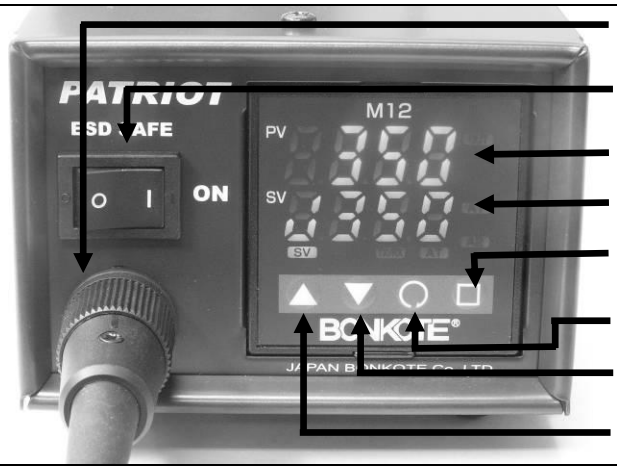
④ Soldering iron unit

NOTE: When purchasing as a set, Controller, soldering iron unit and stand will be set.(Refer left photo)
When only purchasing controller, Soldering iron unit, soldering iron stand will be optional.

※100V with 3PCHI-plug cable, 220V with 3EPV-plug cable will be attached.

(B) Name of the body

《 Front 》



① 5P Connector
② Power switch
③ PV display(Working temperature)
④ SV display(Setting temperature)
⑤ □key(Speed setting)
⑥ ↻ key(Function key)
⑦ ▽key(Setting value Down key)
⑧ △key(Setting value Up key)

《 Back 》

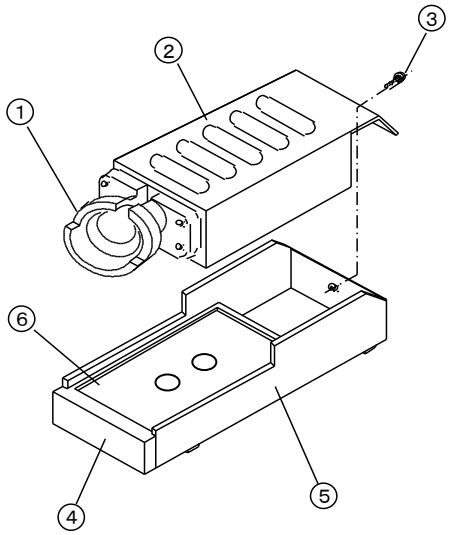
⑨ 3P inlet
⑩ Fuse holder

(C) How to assemble

① Insert the Power cable into 3P inlet.

② Connect the soldering iron to 5P connector at the front, and lock it with rotating to right. Please make sure the voltage of the soldering iron unit is applicable to the input-voltage of M12 controller.

③ Assemble the iron stand and set the soldering iron onto the iron stand.



No.	Name	Model No.
1	Holder	B-11
2	Cover	—
3	Screw with SW	M4x6(with SW)
4	Cleaner case	K-5
5	Base	—
6	Cleaning sponge	S-6

Assemble order

Ⅰ : Remove Screw③ from Base⑤.

Ⅱ : Assemble as holes of Cover② & Base⑤ are overlapped, and tighten a screw.

(D) How to use

① Turn on Power

Insert the power plug in the receptacle and confirm the input-voltage of the soldering iron and that of this controller are the same, then set the power switch ON.

※If use 100V- soldering iron with 220V-input voltage in oversea, it makes heater damaged.

② Setting and confirmation of the sensor input type

M12 controller is workable for 2 different kinds of soldering iron units, one is J-sensor type and the other K-sensor type. Please make sure that the each sensor-type of soldering iron unit and that of controller should be the same. Otherwise, temperature control is unable to work.

※The sensor type is set at the shipment.

～How to confirm the sensor type～

A: Controller part

At the operation mode, J or K is indicated at left side of SV screen.
Controlling with J type indicates J. Controlling with K type indicates K.
Please check the sensor type of the controller is the same as that of connecting soldering iron unit.

《J type》

《K type》

B: Soldering iron unit

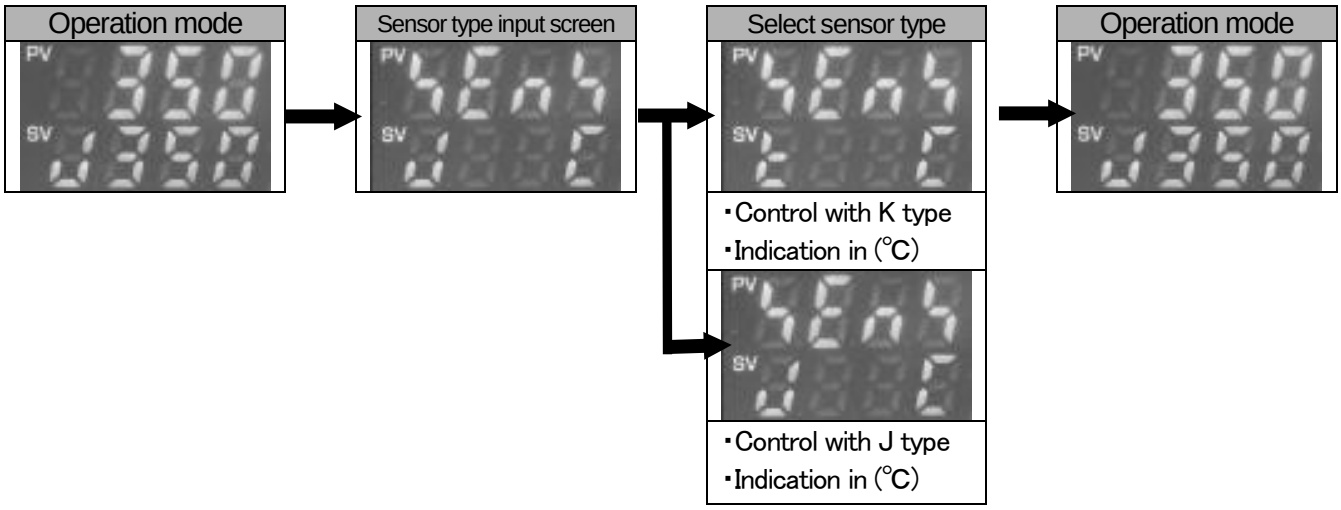
LA soldering iron unit has 2 different kinds of sensor type. J type and K type..
Please check the label of the soldering iron unit.
Alphabet J printed after the model number is J type, no alphabet printed after the model number is K type.

K type soldering iron unit

J type soldering iron unit

～ How to set the sensor type and temperature indication～

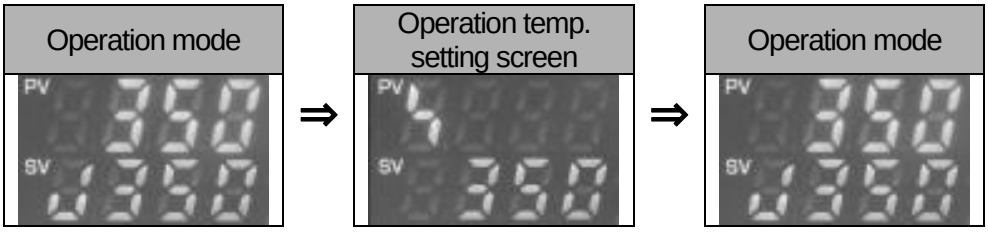
Ⅰ : At the operation mode, press ◯ key approx. 3seconds while pressing ▽ key.
SEn is indicated at PV screen.
Ⅱ : Input suitable sensor type by △ or ▽key, and push ◯ key 7 times to return to operation mode.



③ Set up the operation temperature

Initial setting : 350℃ Setting range : 0 ～ 500℃

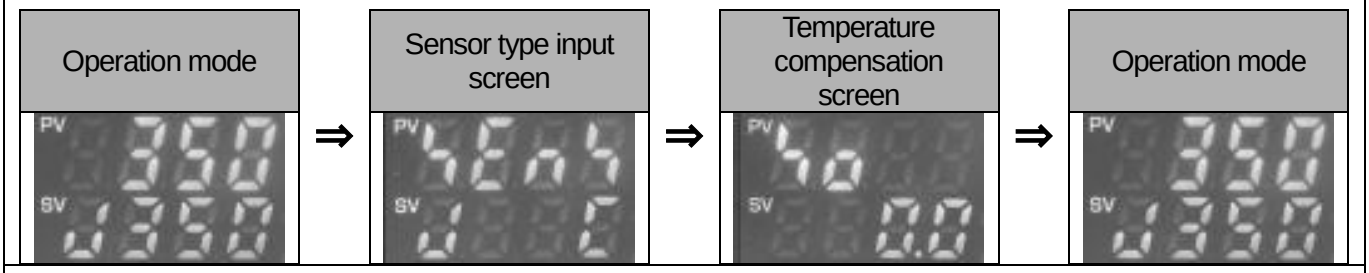
Ⅰ : At the operation mode, press ◯ key once and SV is indicated at PV screen.
Ⅱ : Set up the temperature optionally by △ or ▽ key.
Ⅲ : Press ◯ key to return to the operation mode.



④ Compensation of temperature differences

Initial setting: 0℃ Setting range:－100.0℃ ～ 100.0℃

Ⅰ : At the operation mode, press ◯ key approx. 3 seconds while pressing ▽ key.
SEnS is indicated at PV screen.
Ⅱ : Push ◯ key 3 times, to is indicated at PV screen.
Ⅲ : Input the compensate value by △ or ▽ key at SV screen.
Ⅳ : After input the value, push ◯ key 4 times to return to operation mode.



How to calculate the compensation value by Standard measurement instrument

Example:

Temperature instruments indicates : 350℃ Controller indicates : 355℃

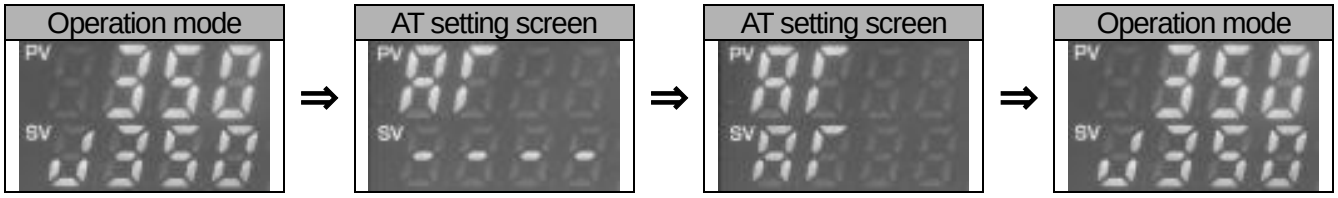
Set the compensation value as －5

The compensation value＝Standard measurement instrument indication－Controller indication

⇒350－355＝－5

⑤ Start Auto-tuning <u>after reach to the operation temperature</u>

Ⅰ : At the operation mode, push ◯ key while pressing △ key, AT is indicated at PV screen.
Ⅱ : Push △ key once, AT is indicated at SV screen.
Ⅲ : Push ◯ key to start Auto-tuning function. (AT blinking is started at right bottom of the screen)
Auto-tuning function is done about 2minuites(AT blinking is stopped at right bottom of the)



The Auto-tuning function automatically calculates the suitable PID value which controls the soldering iron . **<u>Please make sure to implement the Auto-tuning function,</u>** otherwise, a soldering iron may not perform with enough effect.

⚠Attention⚠

Please make sure to implement the Auto-tuning function **<u>after reach to the operation temperature.</u>** **<u>Do not touch the soldering iron</u>** in operation (AT is blinking at right bottom of the screen). PID value is automatically calculated by fluctuation in temperature of iron (about 2minutes).
Thus, touching the soldering iron in operation causes incorrect PID value calculation and the soldering iron may not perform with enough effect.
Auto-tuning is completed when the blinking stops.

Above ④、⑤ are unnecessary to do every time, but do it when change iron tips or the operation temp.

<u>At shipment, the Auto-tuning function is not done yet. Please make sure to do it before use.</u>

6. Optional setting

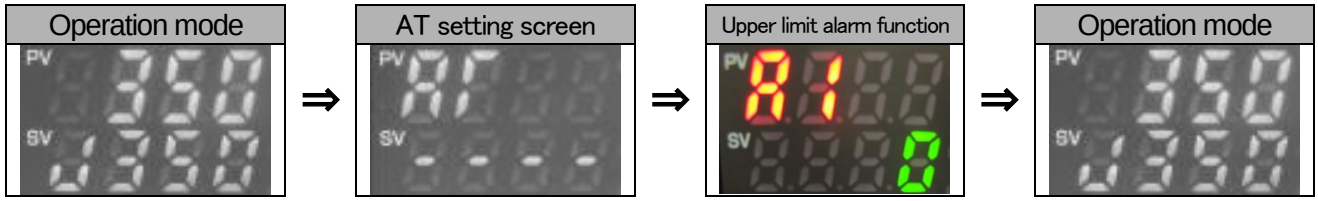
M12 has various functions.　Please use the functions with your convenience.

(A) Alarm function　　Upper limit setting

①　Set the upper limit of operation temperature range

Initial setting:　0℃

Ⅰ : At the operation mode, press ◯ key while pressing △ key.　AT is indicated at PV screen.
Ⅱ : Push ◯ key 5 times,　A1 is indicated at PV screen.
Ⅲ : Input the value by △ or ▽ key at SV screen.　Push ◯ key 2 times to return to operation mode.



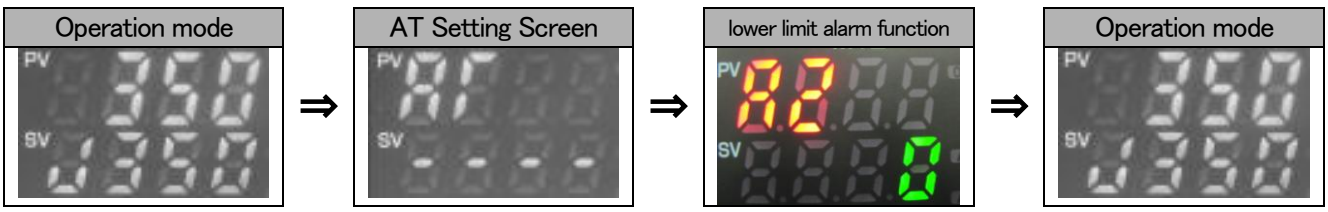
This function can alarm when the operation temperature exceeds the upper limit you set up optionally here.
e.g. Controller setting temp. : 350℃　/　Upper limit temp. : 100℃
　　When the operating temp. exceeds 450℃ at above condition, it works.
Since the factory setting value is 0℃, this function has no effect at the shipment.

(B) Alarm function　　Lower limit setting

①　Set the lower limit of operation temperature range

Initial setting：　0℃

Ⅰ : At the operation mode, press ◯ key while pressing △ key.　AT is indicated at PV screen.
Ⅱ : Push ◯ key 6 times,　A2 is indicated at PV screen.
Ⅲ : Input the value by △▽ key at SV screen.　Push ◯ key once to return to operation mode.



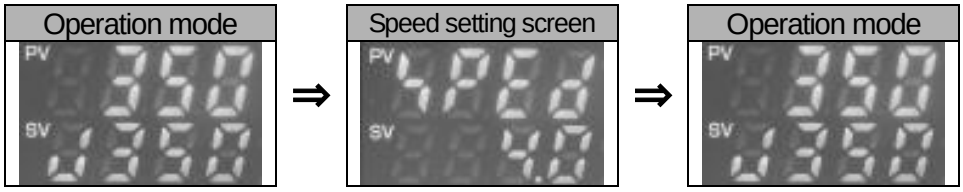
This function can alarm when the operation temperature exceeds the lower limit you set up optionally here.
e.g. Controller setting temp. : 350℃　/　Lower limit temp. : -100℃
　　When the operating temp. falls below -250℃ at above condition, it works.
Since the factory setting value is 0℃, this function has no effect at the shipment.

(C) Temperature Recovery Speed setting

① Control the recovery speed to the operation temperature

Initial setting：4.0　　Setting range：1.0 ～ 10.0

Ⅰ：At the operation mode, push ☐ key once. SPEd is indicated at PV screen.
Ⅱ：Input suitable value by △ or ▽ key at SV screen.
Ⅲ：After input the value, push ☐ key once to return to operation mode.



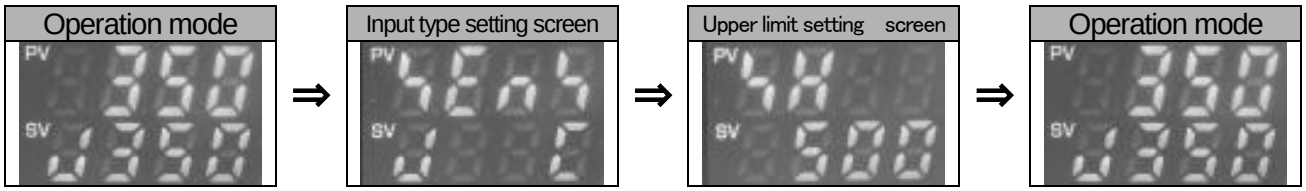
Setting value　1.0 : Recovery speed is fast, and overshooting becomes large.
Setting value 10.0 : Recovery speed is slow, and overshooting becomes small.

(D) Upper limit of operation temperature

① Set the upper limit of operation temperature

Initial setting：500℃　　Setting range：0 ～500℃

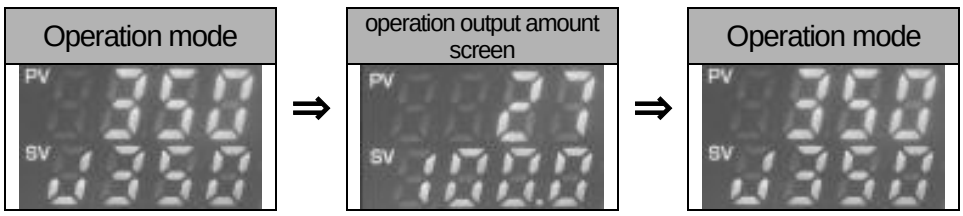
Ⅰ：At the operation mode, press ◯ key while pressing ▽ key about 3 seconds.
SEnS is indicated at SV screen.
Ⅱ：Push ◯ key twice. H is indicated at SV screen.
Ⅲ：Input the value by △ or ▽ key at SV screen, push ◯ key 5 times to return to operation mode.



(E) Monitor indication of the operation output amount

① Monitoring the operation output amount of heater

Ⅰ：At the operation mode, press ◯ key about 3 seconds.
Operation output amount（0～100%） is indicated at SV screen.
Ⅱ：Push ◯ key to return to operation mode.



(F) Lock function

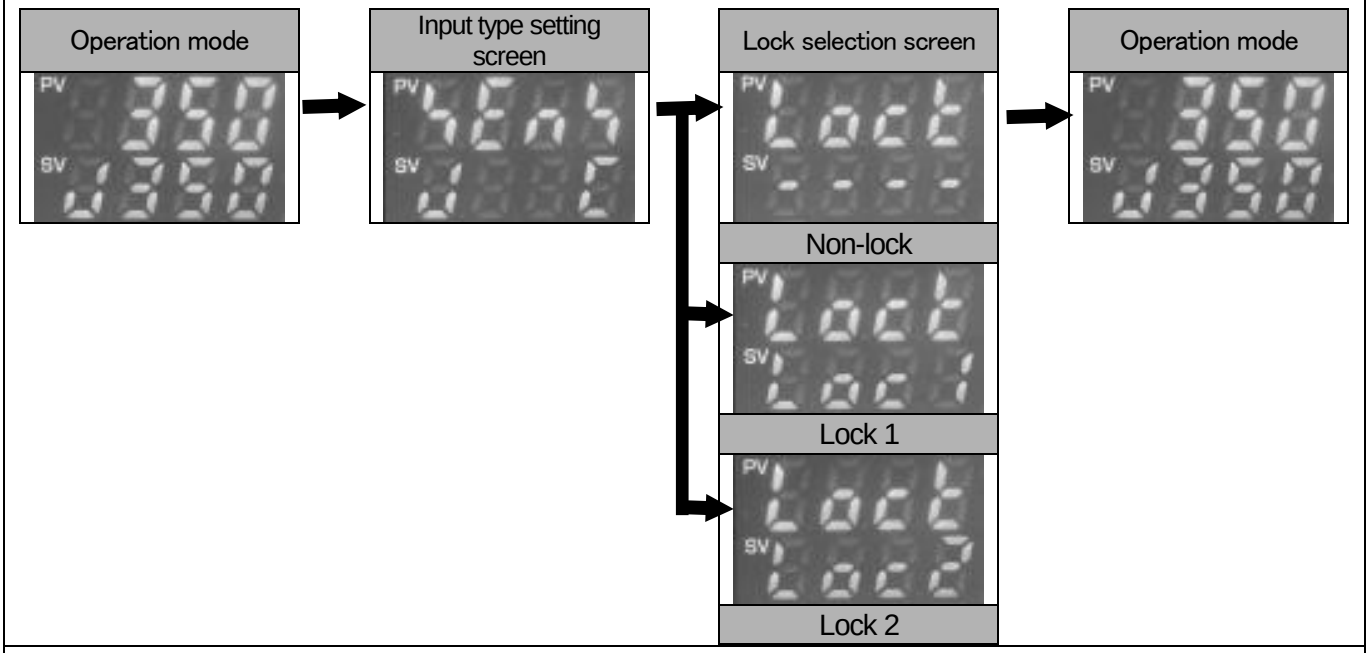
① Lock the setup values to prevent error setting

Initial setting：Non-lock

Ⅰ At the operation mode, press ◯ key while pressing ▽key about 3 seconds.
"ENT" is indicated at PV screen.

Ⅱ Push ◯ key once, "Lock" is indicated at PV screen.

Ⅲ Select the type of lock by △ or ▽ key, push ◯ key 6 times to return to operation mode.



---- : Non lock

Loc1 : Only the lock function is workable.

Loc2 : The lock function and the operation temperature function are workable.

(G) Anti-reset wind-up setting

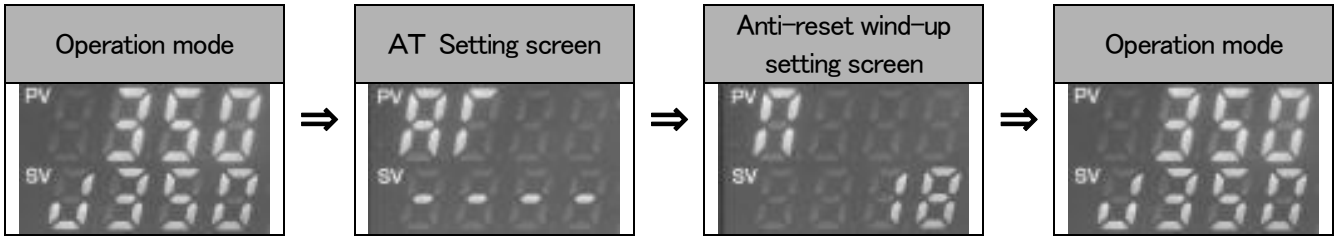
① Control Overshooting

Initial setting：18%　　Setting range：0 ～ 100%

Ⅰ：At the operation mode, push ◯ key while pressing △ key. "AT" is indicated at PV screen.

Ⅱ：Push ◯ key 4 times, "R" is indicated at PV screen.

Ⅲ：After input the value by △▽ key at SV screen, push ◯ key 3 times to return to operation mode.

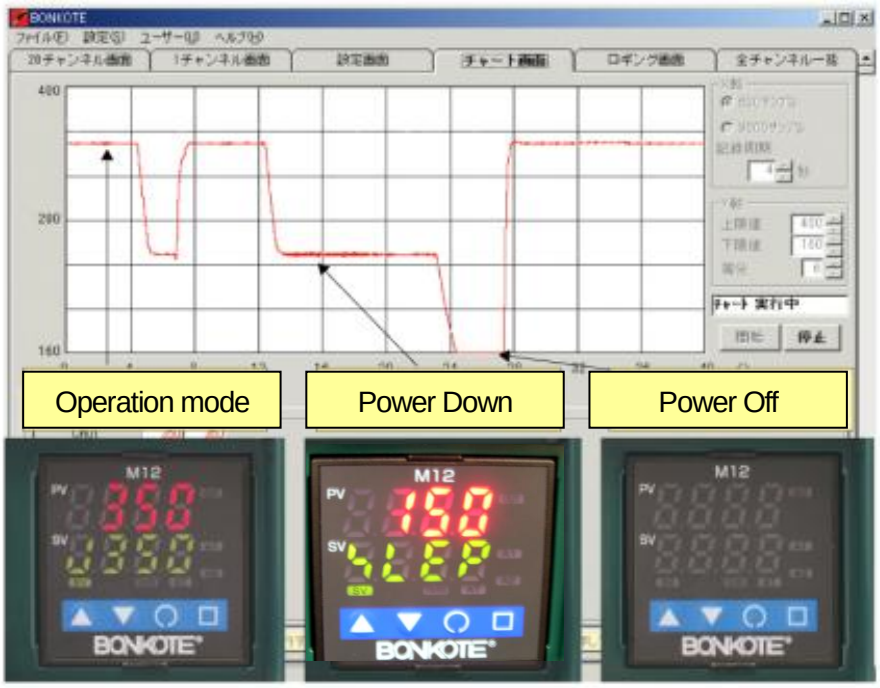


It is recommendable to remain the default. The lower value than the default can restrain overshooting but there might be possible not to recover to the operation temperature.

(H) Auto-Power Down／Auto-Power Off Function

（1） Setting of parameter value

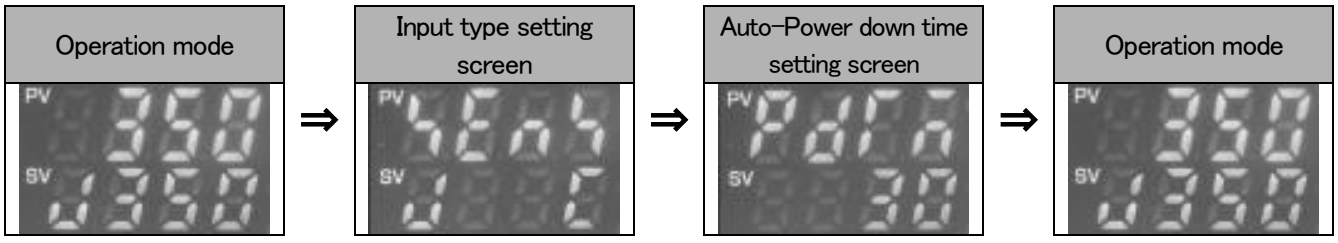
In order to prevent soldering iron tips from Deterioration and Oxidization, the temperature of tip is lowered (Power Down), and the supplying electric power to the heater is stopped (Power Off) automatically when the temperature of tip does not change during a certain period of time (user-settable).
This function is not only effective for saving energy but also for safety.



① Setting of Auto-Power Down time

Initial setting ：30 minutes　　Setting range：0～ 120 minutes

Ⅰ At the operation mode, press ◯ key while pressing ▽ key about 3seconds.
　 ｴﾝｽ is indicated at PV screen.
Ⅱ Push ◯ key 4 times, ﾊﾞｯﾃｨ is indicated at PV screen.
Ⅲ Input the value by △ or ▽ key, push ◯ key 3 times to return to operation mode.

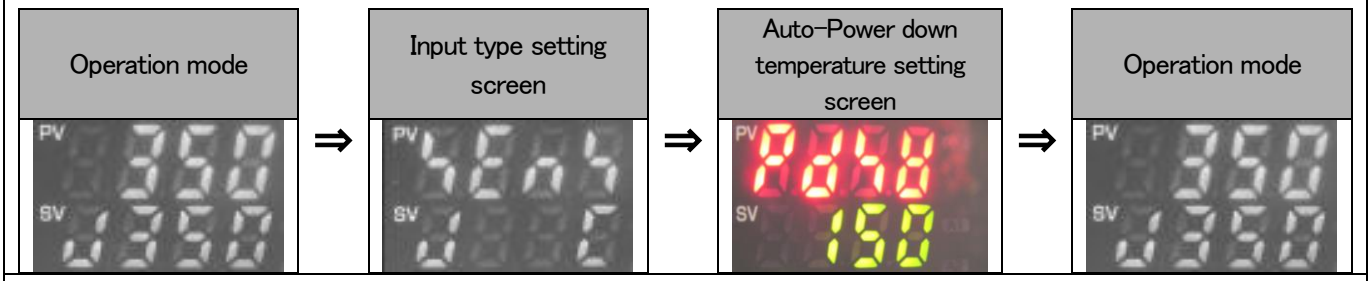


Auto-Power Down time
This function lowers the temperature of iron tip down automatically when the temperature is no change for more than a certain period of time you set up here since the controller recognizes that the iron unit is not in use.
During Auto-Power Down function, ｽﾘｰﾌﾟ and the temperature you set up will be indicated alternately.
If unnecessary, set up the value 0 and this function becomes ineffective..

② Setting of Auto-Power Down temperature

Initial setting : 150℃ Setting range : 0 ～ (operation temp.) −1℃

Ⅰ At the operation mode, press ◯ key while pressing ▽ key about 3seconds.
SEnS is indicated at PV screen.
Ⅱ Push ◯ key 5 times, Pdhb is indicated at PV screen.
Ⅲ Input the value by △ or ▽ key, push ◯ key 2 times to return to operation mode.



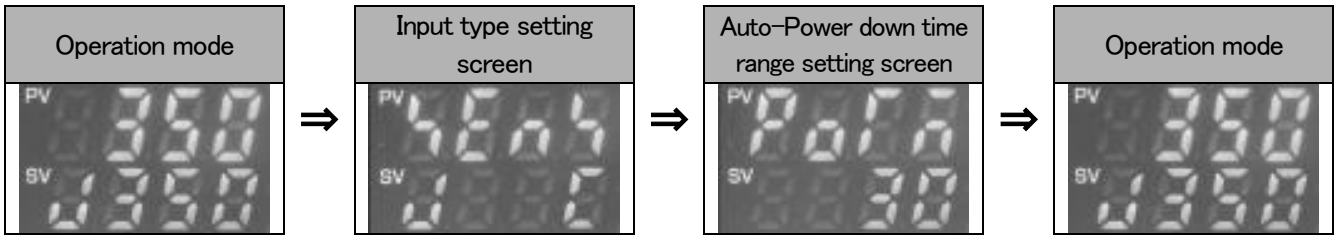
Auto-Power Down temperature is the temperature in Auto-Power Down operation .
The temperature of iron tip falls down and stands by at the specific temperature you set up.

- In case the operation temp. is 350℃, Auto-Power Down temperature can be set ≦349℃. only.

③ Setting of Auto-Power Off time

Initial setting : 30 minutes Setting range : 0 ～120 minutes

Ⅰ At the operation mode, press ◯ key while pressing ▽ key about 3seconds.
SEnS is indicated at PV screen.
Ⅱ Push ◯ key 6 times, PoFn is indicated at PV screen.
Ⅲ Input the value buy △ or ▽ key, push ◯ key once to return to operation mode.



Auto-Power Off time
This function turns off the power of the controller automatically when the temperature of iron tip is no change for more than a certain period of time , you set up, during Auto-Power down mode (SLEP is blinking at SV value) since the controller recognizes that the iron unit is not in use.
If unnecessary, set up the value 0 and this function becomes ineffective

(2) Other operation methods

① Return to operation mode from Auto-Power Down

Ⅰ : When the temperature move out from the Auto-Power Down temperature range(initial value: 5℃), Auto-Power Down function is released, and return to the operation mode. For example clean iron tip by moisturized sponge is easy to return.
When Auto-Power Down is not released, press △ or ▽ key more than 3seconds to release.

Ⅱ : At Auto-Power Down mode, press △ or ▽ key more than 3 seconds to return to operation mode.

② Return to operation mode from Auto-Power Off

Ⅰ : Turn on the power again.

③ Manual operation

Ⅰ : At the operation mode, after reach to setting temperature, press △ or ▽ key more than 3 seconds to move to Auto-Power Down.

Ⅱ : At Auto-Power Down mode, press △ or ▽ key more than 3 seconds to return to operation mode.

(I) PID value manual setting

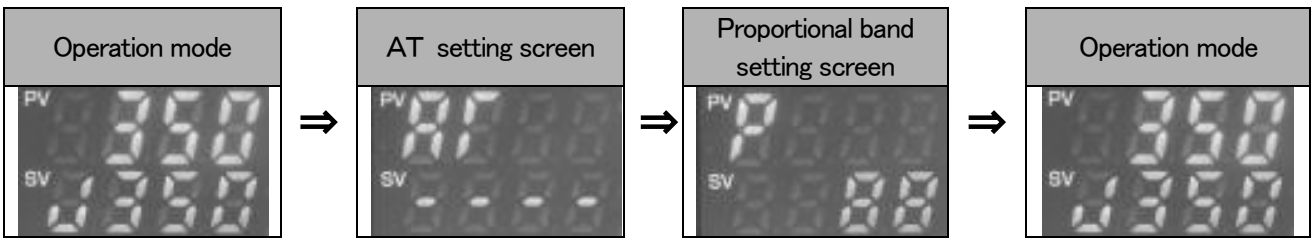
This machine is basically unnecessary to do PID setting because loading Auto-tuning function. It is able to do manual setting if overshooting which soldering iron tip temperature become high, occurred with special work. Please use PID manual setting with your convenience.

	Major effect
P proportional band	Overshoot become less with bigger value however, temperature recovery time become longer and temperature drops during soldering may be larger.
I integration time	Overshoot become less with bigger value however, temperature recovery time become longer and temperature drops during soldering may be larger.
D derivative time	Overshoot become less with smaller value however, temperature recovery time become longer. This value will be set or adjusted after P value and I value is set.

① Setting of Proportional band

Initial setting : 88℃ Setting range : 0～ 1000℃

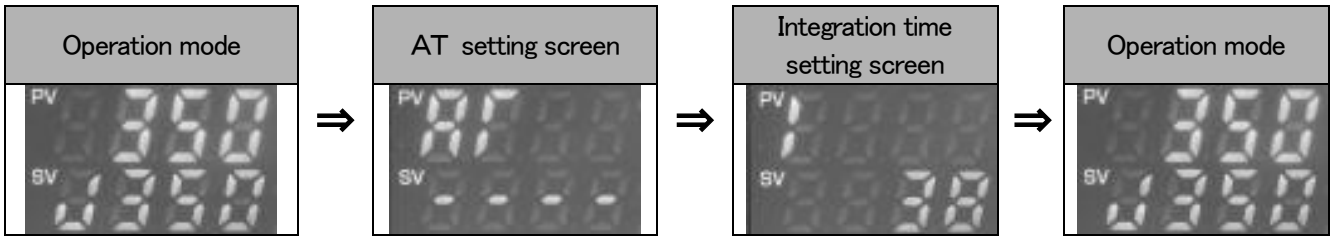
Ⅰ : At the operation mode, push ◯ key while pressing △ key. AT is indicated at PV screen.
Ⅱ : Push ◯ key once, P is indicated at PV screen.
Ⅲ : Input the value by △ or ▽ key, push ◯ key 6 times to return to operation mode



② Setting of Integration time

Initial setting：38seconds　　Setting range：0～ 1000℃

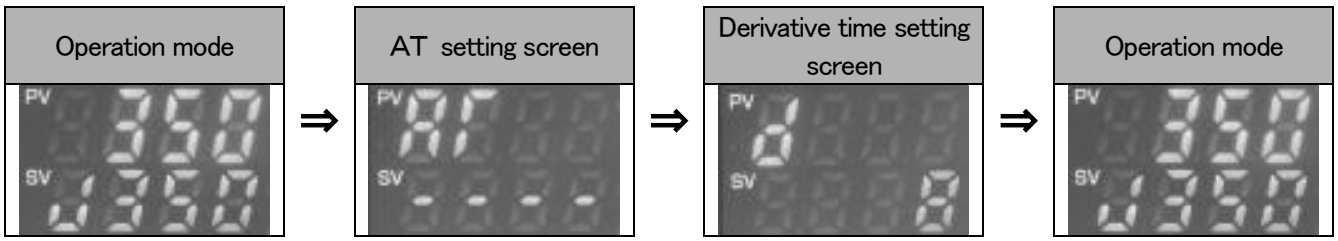
Ⅰ：At the operation mode, push ◯ key while pressing △ key. AT is indicated at PV screen.
Ⅱ：Push ◯ key 2 times, I is indicated at PV screen.
Ⅲ：Input the value by △▽ key, push ◯ key 5 times to return to operation mode.



③ Setting of Derivative time

Initial setting: 8 seconds　　Setting range: 0 ~ 300℃

Ⅰ：At the operation mode, push ◯ key while pressing △ key. AT is indicated at PV screen.
Ⅱ：Push ◯ key 3 times, d is indicated at PV screen.
Ⅲ：Input the value by △▽ key, push ◯ key 4 times to return to operation mode.



7． Character list

All character setting of M12 listed.

△key ＋ ↻ key

↓

Auto-tuning

↓

Proportional band setting

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Integration time setting

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Derivative time setting

↓

Anti-reset wind-up setting

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Upper limit alarm setting

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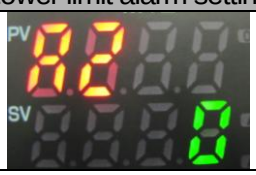
Lower limit alarm setting



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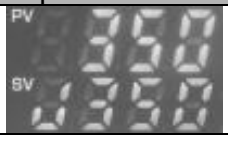
Operation mode



▽key ＋ ↻ key

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Input type setting

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Lock function selection

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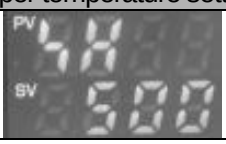
Upper temperature setting



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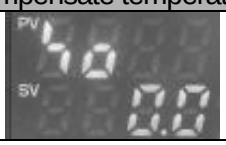
Compensate temperature



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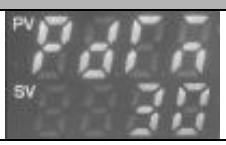
Auto-Power Down time setting



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Auto-Power Down Temperature Setting

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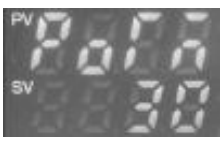
Auto-Power Off time setting



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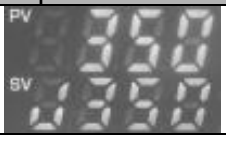
Operation mode



↻ key

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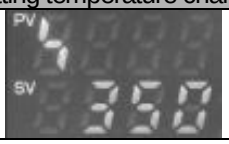
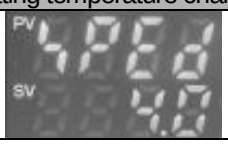
Setting temperature change



□key

↓

Setting temperature change



↻ Key press

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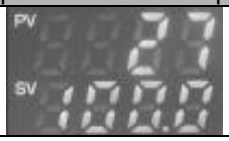
Operation amount output



8. How to maintenance

(A) Maintenance of M12 controller

(1) Replacement of Fuse

①Loosen the fuse holder and remove it. Check the fuse if need change, and replace to a new fuse.

Model No.	Specification
Fuse 3A	Glass fuse 250V 3A(φ5.2×20mm)

9. Standard specification

(A) Specification of M12 controller

Input voltage	AC100～240V
Temperature range	0～500℃(At shipment)
Power cable	100V:3PCHI 220V:3EPV
Dimension	97(W)×73(H)×130(D)mm
Weight	≦ 750kg
Fuse	3A
Temperature control method	PID control (Auto-tuning setting)
Temperature indication	PV:LED(red), SV:LED(green)
Error indication	"— — — —" Over scale :Temperature exceed upper limitation of indicatable temperature ※ Error of sensor (indication) "_ _ _ _" Under scale :Temperature exceed lower limitation of indicatable temperature ※ Reversed polarity of sensor (indication)
Material (case)	Steel
Power consumption	≦ 10VA (Controller only)

10. Guarantee and After sales service of M12

(A) Trouble shooting

Condition	Cause	Measures	Page
Soldering iron is not heated	1. Unable to power on		
	①Is the power cord connected with the receptacle? Is the power switch ON?	Check the power cord and the switch	P.4
	②Is the fuse blown?	Replace to a new fuse	P.16
	2. Soldering iron is not heated although power is on		
	①Is the soldering iron and the controller completely connected?	Check the connecting	
	② Is the soldering iron tip sensor completely connected to the soldering iron?	Check how to replace soldering iron tip	
	③Is the heater element consumed?	Check the conduction and replace to new heater element	
Temperature unstable	① Is the Auto-tuning function implemented ?	Implement the Auto-tuning function	P.7
	②Temperature does not reach the setting temperature	Implement the Anti-reset wind up function.	P.10
	③Over-shooting is large		
Key operation is unable	①Is the lock function effective?	Check the setting of Lock function	P.10

(B) Guarantee

Our products are shipped after several factory test & inspection. But if you find malfunctions or defects due to problems in workmanship or transportation, please contact with your dealer or us.

The guarantee period of your products is in one year after your purchase, except for replacement parts.

(C) After sales service

When you think your system does not operate properly, read this manual again to check.

If still troubles are not solved, please contact with your dealer or us.

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